REMARKS

Claims 1-15 are pending in the application; the status of the claims is as follows:

Claims 10 and 11 are objected to because of informalities.

Claims 1-4, 6, 7, and 9 are rejected under 35 U.S.C. § 102(b) as being anticipated by Japanese Published Application No. 2001-290183 to Takayuki ("Takayuki").

Claims 1-5, 7, and 8 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,619,030 to Shiomi ("Shiomi").

Claims 10-13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Shiomi in view of U.S. Patent No. 5,861,915 to Sato et al ("Sato").

Claims 14 and 15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Shiomi in view of U.S. Patent No. 5,376,993 to Kubota et al ("Kubota").

The acknowledgement, in the Office Action, of a claim for foreign priority under 35 U.S.C. § 119(a)-(d), and that the certified copy of the priority document has been received, is noted with appreciation.

Claims 1 and 4-6 have been amended to more clearly specify the claimed invention. These changes are not necessitated by the prior art, are unrelated to the patentability of the invention over the prior art, and do not introduce any new matter.

35 U.S.C. § 102(b) Rejections

The rejection of claims 1-4, 6, 7, and 9 under 35 U.S.C. § 102(b) as being anticipated by Takayuki, is respectfully traversed based on the following.

Takayuki shows a camera having a vibration control mechanism. A machine translation of Takayuki from the Japanese Patent Office's web site is provided herewith for convenience. (As noted in the warning beginning on page 2 of the translation, machine translations may not reflect the original precisely. No certification herein of the accuracy of the translation is provided or implied.) Sensors 4 and 5 are gyroscopic type sensors that sense pitch and yaw motion (¶ 12). Figure 2 is an example of one of sensors 4 and 5, which are identical (¶¶ 15-17). When the shutter switch SW2 is fully depressed, signifying the picture taking operation, the sampling rate of CPU 2 of the pitch sensor is set at twice that of the yaw sensor (¶ 29).

In contrast to the cited references, claim 1 includes:

> a first shake detecting section having a first shake sensor which detects a shake of the image sensing apparatus in a first direction, the first shake sensor having a first detection characteristic;
>
> a second shake detecting section having a second shake sensor which detects a shake of the image sensing apparatus in a second direction, the second shake sensor having a second detection characteristic different from the first detection characteristic; ...

Both sensors 4 and 5 of the Takayuki reference are identical. Therefore, they cannot have different detection characteristics. To anticipate, a reference must show, expressly or inherently, every limitation of the claim. MPEP §2131. The cited references do not show or suggest "the second shake sensor having a second detection characteristic different from the first detection characteristic." Therefore, the cited references do not anticipate claim 1. Claims 2-4 and 6 are dependent upon claim 1 and thus include every limitation of claim 1. Therefore, claims 2-4 and 6 are also not anticipated by the cited references.

Also in contrast to the cited references, claim 7 includes:

> a yaw sensor which detects a shake of the image sensing apparatus in a yaw direction;

> a pitch sensor which detects a shake of the image sensing apparatus in a pitch direction, the pitch sensor having a detection precision higher than the yaw sensor; ...

As noted above, the pitch and yaw sensors 4 and 5 in Takayuki are identical. Thus, the cited reference does not show or suggest an apparatus where "the pitch sensor having a detection precision higher than the yaw sensor." Therefore, claim 7 is not anticipated by the cited references. Claim 9 is dependent upon claim 7 and thus include every limitation of claim 7. Therefore, claim 9 is also not anticipated by the cited references.

Accordingly, it is respectfully requested that the rejection of claims 1-4, 6, 7, and 9 under 35 U.S.C. § 102(b) as being anticipated by Takayuki, be reconsidered and withdrawn.

The rejection of claims 1-5, 7 and 8 under 35 U.S.C. § 102(b) as being anticipated by Shiomi, is respectfully traversed based on the following.

In Shiomi, a 2-dimensional area sensor 6 is used for detecting a fluctuation in a low frequency region. Two angular velocity sensors 2 are used for detecting a fluctuation in a high frequency region (column 3, lines 21-45). The x direction signals from both the 2-dimensional sensor and the angular velocity sensor are processed and combined to provide a signal to driving signal generation circuit 16 via comparison circuit 17. The output of the driving signal generation circuit 16 drives correction optical system 20 via correction optical signal system driving circuit 18. (column 4, lines 26-41). The correction optical signal system driving circuit drives yoke portion 70. (column 5, lines 11-14) A parallel set of circuits is provided for the y direction. (column 4, lines 51-55). The correction optical signal system driving circuit from this parallel set of circuits drives yoke portion 71. (column 5, lines 11-14) Of importance, the x and y signals from the angular velocity sensors and the 2-dimensional array sensor are never combined, but rather complete optical system driving circuits are provided separately for both the x and y directions.

In a second embodiment, as shown in Figures 6A and 6B, a signal selection circuit is used to select between the signal derived from the angular velocity sensor 2 or the signal derived from the 2-dimensional area sensor 6. This replaces high pass filter 23 and low pass filter 24 of the embodiment of Figures 1A and 1B. In a third embodiment, Figure 8, these signals are combined digitally. (column 7, lines 40-5). In neither of these embodiments are signals detected from the x direction combined with signals from the y direction.

In contrast to the cited references, claim 1 includes:

> a first shake detecting section having a first shake sensor which detects a shake of the image sensing apparatus in a first direction, the first shake sensor having a first detection characteristic;
> a second shake detecting section having a second shake sensor which detects a shake of the image sensing apparatus in a second direction, the second shake sensor having a second detection characteristic different from the first detection characteristic; and
> a shake correcting section which corrects a shake of the image sensing apparatus based on outputs from the first shake detecting section and the second shake detecting section.

In Shiomi, signals from the different type sensor are combined only with signals in a same direction. However, claim 1 includes a "shake correcting section" that corrects based on "first and second shake detecting sections" that detect in first and second directions. This is neither shown nor suggested in the cited reference. Therefore, the cited references do not anticipate claim 1. Claims 2-5 are dependent upon claim 1 and thus include every limitation of claim 1. Therefore, claims 2-5 are also not anticipated by the cited references.

Also in contrast to the cited references, claim 7 includes:

> a yaw sensor which detects a shake of the image sensing apparatus in a yaw direction;

> a pitch sensor which detects a shake of the image sensing apparatus in a pitch direction, the pitch sensor having a detection precision higher than the yaw sensor; and
>
> a shake correcting section which corrects a shake of the image sensing apparatus based on an output signal from the yaw sensor and an output signal from the pitch sensor.

As noted above, Shiomi does not show or suggest a shake correcting section that combines signals from different directions. Thus, the cited reference does not show or suggest a section that "corrects a shake of the image sensing apparatus based on an output signal from the yaw sensor and an output signal from the pitch sensor." Therefore, claim 7 is not anticipated by the cited references. Claim 8 is dependent upon claim 7 and thus include every limitation of claim 7. Therefore, claim 8 is also not anticipated by the cited references.

Accordingly, it is respectfully requested that the rejection of claims 1-5, 7 and 8 under 35 U.S.C. § 102(b) as being anticipated by Shiomi, be reconsidered and withdrawn.

35 U.S.C. § 103(a) Rejections

The rejection of claims 10-13 under 35 U.S.C. § 103(a), as being unpatentable over Shiomi in view of Sato, is respectfully traversed based on the following.

Claims 10-13 are dependent upon claim 7, and thus include every limitation of claim 7. As noted above, Shiomi does not show or suggest a shake correcting section that combines signals from different directions. Sato shows a deviation correction mechanism with velocity sensors. As with Shiomi, the compensation signals in the y and p directions are never combined. Thus, there is no suggestion in either reference of:

> a yaw sensor which detects a shake of the image sensing apparatus in a yaw direction;
>
> a pitch sensor which detects a shake of the image sensing apparatus in a pitch direction, the pitch sensor having a detection precision higher than the yaw sensor; and
>
> a shake correcting section which corrects a shake of the image

> sensing apparatus based on an output signal from the yaw sensor and an output signal from the pitch sensor.

To support a *prima facie* case for obviousness, the cited references, singularly or in combination, must show or suggest every element of the claim. MPEP §2143.03. Because neither reference, nor the combination of the references, shows or suggests the quoted limitations, claims 10-13 are not obvious over the cited references.

Accordingly, it is respectfully requested that the rejection of claims 10-13 under 35 U.S.C. § 103(a) as being unpatentable over Shiomi in view of Sato, be reconsidered and withdrawn.

The rejection of claim 15 under 35 U.S.C. § 103(a), as being unpatentable over Shiomi in view of Kubota, is respectfully traversed based on the following.

Claim 15 is dependent upon claim 7, and thus includes every limitation of claim 7. As noted above, Shiomi does not show or suggest a shake correcting section that combines signals from different directions. Kubota shows a correction device with a pitch sensor 6 and a roll sensor 7. There is no discussion in Kubota of the relative sensitivities of these velocity sensors. In addition, although Kubota shows these signals being applied to a one amplifier, the text indicates that these signals remain separate. (column 6, line 57 – column 7, line 9) Thus, there is no suggestion in either reference of:

> a yaw sensor which detects a shake of the image sensing apparatus in a yaw direction;
>
> a pitch sensor which detects a shake of the image sensing apparatus in a pitch direction, the pitch sensor having a detection precision higher than the yaw sensor; and
>
> a shake correcting section which corrects a shake of the image sensing apparatus based on an output signal from the yaw sensor and an output signal from the pitch sensor.

Because neither reference, nor the combination of the references, shows or suggests the quoted limitations, claim 15 is not obvious over the cited references.

Accordingly, it is respectfully requested that the rejection of claim 15 under 35 U.S.C. § 103(a) as being unpatentable over Shiomi in view of Kubota, be reconsidered and withdrawn.

CONCLUSION

Wherefore, in view of the foregoing amendments and remarks, this application is considered to be in condition for allowance, and an early reconsideration and a Notice of Allowance are earnestly solicited.

This Amendment does not increase the number of independent claims, does not increase the total number of claims, and does not present any multiple dependency claims. Accordingly, no fee based on the number or type of claims is currently due. However, if a fee, other than the issue fee, is due, please charge this fee to Sidley Austin Brown & Wood LLP's Deposit Account No. 18-1260.

Any fee required by this document other than the issue fee, and not submitted herewith should be charged to Sidley Austin Brown & Wood LLP's Deposit Account No. 18-1260. Any refund should be credited to the same account.

If an extension of time is required to enable this document to be timely filed and there is no separate Petition for Extension of Time filed herewith, this document is to be construed as also constituting a Petition for Extension of Time Under 37 C.F.R. § 1.136(a) for a period of time sufficient to enable this document to be timely filed.

Any other fee required for such Petition for Extension of Time and any other fee required by this document pursuant to 37 C.F.R. §§ 1.16 and 1.17, other than the issue fee,

and not submitted herewith should be charged to Sidley Austin Brown & Wood LLP's Deposit Account No. 18-1260. Any refund should be credited to the same account.

Respectfully submitted,

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November 9, 2004

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2001-290183

(43)Date of publication of application : 19.10.2001
(51)Int.CI.

G03B 5/00

G03B 17/14

(21)Application number : 2000-102688 (71)Applicant : CANON INC
(22)Date of filing : 04.04.2000 (72)Inventor : ENDO TAKAYUKI
(54) VIBRATIONPROOF CONTROLLER AND CAMERA HAVING IT
(57)Abstract:
PROBLEM TO BE SOLVED: To enhance the accuracy of an image blurring preventive system without using an expensive microcomputer by which high-speed processing is attained.
SOLUTION: The state of a switch SW2 is detected by the second stroke of a shutter button by a CPU 2. The sampling of blurring detection in a pitch direction is set to be the double of that in a yaw direction when the switch SW2 is turned on, and the rise-up operation of a mirror 6 is performed. Then, the exposure of film is started by running a shutter front curtain. The exposure is finished by running a shutter rear curtain based on the calculated shutter speed, so that the mirror is returned to a home position. Then, the double sampling of the blurring direction in the pitch direction is returned to a normal state.

LEGAL STATUS
[Date of request for examination]
[Date of sending the examiner's decision of rejection]
[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]
[Date of final disposal for application]
[Patent number]
[Date of registration]
[Number of appeal against examiner's decision of rejection]
[Date of requesting appeal against examiner's decision of rejection]
[Date of extinction of right]

* NOTICES *

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1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION [Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] This invention relates to the camera system and lens system which have an image blurring detection means to detect the deflection of the system to space, and an image blurring amendment means to perform image blurring amendment according to the output of the image blurring detection means.
[0002]
[Description of the Prior Art] In order to amend image blurring by blurring at the time of photography etc. conventionally, the image blurring amendment camera which has an image blurring amendment function is proposed. This is made to prevent image blurring generated by a photography person's blurring by driving movable amendment optical system in the perpendicular direction to an optical axis according to this output using the sensor, for example, the oscillating gyroscope, which detects the amount of deflections of the body of a camera.
[0003] For example, in JP,07-191354,A, it sways in a camera, and image blurring amendment optical system is arranged in a sensor and an interchangeable lens, A/D conversion of the amount of deflections of a yaw and the pitch direction is carried out by turns in the camera system which connected between both through the serial interface based on a predetermined communication link format, and the image blurring prevention system which transmits the deflection data through said serial interface is indicated.
[0004]
[Problem(s) to be Solved by the Invention] However, at the time of camera use, vibration occurs with the drive of a mirror, a shutter curtain, etc.
[0005] The sensor output wave in alignment with the timing chart of the camera at the time of the release in a camera standing condition was shown in drawing 11 . According to the actual mirror rise initiation actuation after mirror energization, the deflection of a RF occurs and follows the sensor output of the pitch direction, and a deflection occurs again in the completion of a mirror rise. After predetermined time progress, shortly, point curtain transit of a shutter is started, a deflection occurs according to it, and a deflection also generates the completion of point curtain transit after that. Next, back curtain transit is started, a deflection occurs again synchronizing with the transit initiation and completion of transit, and, finally a deflection comes to occur synchronizing with mirror down actuation.
[0006] Drawing 12 is a wave form chart showing the condition that the output of the sensor of the pitch direction when the hand deflection has occurred before and after exposure, i.e., the output which ****ed to the actual deflection, and a shutter shock and a mirror shock were compounded. if a release switch is pushed, it will be first based on a mirror rise -- swaying

(before or after 30Hz) -- it generates and then is based on transit of the point curtain of a shutter -- swaying (100-200Hz) -- it generates and is based on transit of the back curtain of a shutter after the exposure time -- swaying (100-200Hz) -- it generates. And the deflection (before or after 30Hz) by mirror down occurs at the last. If this is a stock, blurring (0.5-15Hz) will join these deflections further.
[0007] Thus, the amount of deflections of the RF of the pitch direction by the shutter shock and mirror shock which are generated with a camera had the trouble of being undetectable, with the sampling means of deflection detection like this conventional kind of image blurring prevention system.
[0008] Although deflection detection can be performed with a sufficient precision if the microcomputer in which high-speed processing is possible is used to the deflection of the camera of the RF by these shutter shocks and mirror shocks, the microcomputer of the high speed which can detect the deflection of a RF is more expensive than the microcomputer which processes the mechanism of a common camera etc., and the cost rise of the whole camera is no longer avoided.
[0009] Then, this invention makes it the technical problem to raise the precision of an image blurring prevention system, without using the expensive microcomputer in which high-speed processing is possible.
[0010]
[Means for Solving the Problem] The vibrationproofing control unit of this invention for solving the above-mentioned technical problem A Bure detection means to detect the deflection of the system to space, and the movable device section which moves in the predetermined direction, It has an amendment means to perform Bure amendment according to the output of said Bure detection means, and an operation means to calculate the amount of Bure amendments of said amendment means according to the output of said Bure detection means. Said operation means The number of samplings per [which detects the deflection of the direction of a deflection of the system produced as reaction by migration of said movable device section generated during migration of said movable device section, and the direction which carries out abbreviation coincidence] unit time amount of deflection detection of said Bure detection means As compared with deflection detection of the direction of a deflection of the system produced as reaction by migration of said movable device section, and the direction of [other than the direction which carries out abbreviation coincidence], it is made [many].
[0011] Moreover, a fixed period when the operation means mentioned above includes under migration of said movable device section at least As compared with periods other than said fixed period, the number of samplings per [which detects the deflection of the direction of a deflection of the system produced as reaction by migration of said movable device section generated during migration of said movable device section and the direction which carries out abbreviation coincidence] unit time amount of deflection detection of said Bure detection means may be made [many].
[0012]
[Embodiment of the Invention] (1st operation gestalt) Drawing 1 is the block diagram of the body of a camera in which the 1st whole operation gestalt configuration of this invention is shown, and a lens. CPU2 which manages the whole control is in the body 1 of a camera, and the sensors 4 and 5 which detect the yaw of the whole camera and the deflection of the pitch direction further are arranged in a camera, and this sensor output is changed [both] into digital data by A/D converter 3, and is incorporated as data in the above CPU 2.

[0013] The sensor data incorporated in CPU2 are transmitted to CPU11 in an interchangeable lens through the usual serial bus line 7 which exchanges information on the body 1 of a camera, and an interchangeable lens 8.
[0014] Within an interchangeable lens 8, the output of location detection means 15 and 16 of amendment optical-system 9 the very thing to detect a location absolutely is changed into digital data by A/D converter 18, and it is incorporated in the above CPU 11, and further, by CPU11, the sensor data from the body of a camera mentioned above are compared with the location data of this amendment optical system 9, and that comparison result is transmitted to D/A converter 12. And finally the output from this D/A converter is inputted into driver circuits 13 and 14, and the amendment optical system 9 drives it according to the supply voltage from this driver circuit.
[0015] Drawing 2 is the block diagram of an example of sensors 4 and 5. Sensors 4 and 5 consist of the oscillating gyroscope 20 and the integrator circuit.
[0016] The resonance drive of the oscillating gyroscope 20 is carried out by the drive circuit 22. Output conversion is performed as the output of the oscillating gyroscope 20 performs predetermined angular-velocity detection by the synchronous-detection circuit 21. Usually unnecessary DC offset is included in the output from this synchronous-detection circuit 21, a part for this DC is removed with the high-pass filter which consists of a capacitor 24 and resistance 25, and only the remaining deflection signal is amplified. Amplifier for that consists of an op amplifier 23 and resistance 26 and 27.
[0017] Furthermore, it integrates with the output of this amplifier, and is changed into the output which swayed and is proportional to a variation rate, and this integrator output is connected to A/D converter 3. An integrating circuit for that consists of an op amplifier 28, resistance 29 and 30, and a capacitor 31.
[0018] Drawing 3 is the exploded view of the amendment optical system 9. This amendment optical system 9 is the so-called shift optical system which amends the include-angle deflection of a camera by carrying out the parallel shift of the lens in the xy direction perpendicular to an optical axis. 50 and 51 are the actuator sections as a magnetic-circuit unit used as the driving source of actual x and the direction of the y-axis, respectively, and 52 and 53 are the coil sections corresponding to each actuator. The eccentric drive of the lens group 54 which are some taking lenses is carried out in x and the direction of the y-axis by supplying a current from the driver circuits 13 and 14 mentioned above in this coil section. 55 is the support arm and housing for fixing the above-mentioned lens 54.
[0019] On the other hand, a motion of this lens group 54 is detected by non-contact with combination with PSD 62 and 63 attached on the lens-barrel section 60 for holding whole IRED 56 and 57 and the whole lens which move united with a lens.
[0020] 58 is a lock device for holding a lens to an abbreviation optical-axis center position centering on an optical axis, when the energization to this shift system is stopped.
[0021] 59 is a charge pin.
[0022] 61 is a support ball as a doorstop for this shift system falling and regulating a direction.
[0023] Drawing 4 is a flow chart for explaining actuation of the camera lens system of this invention.
[0024] First, CPU2 performs from #101 condition detection of the switch SW1 switch on by the 1st stroke of a release carbon button in #102. If this switch SW1 is off, it remains in #102, if it is ON, it progresses to #103, and a gyroscope is started.
[0025] Then, the pitch actuator for image blurring amendment and a yaw actuator are driven in #104, and hand deflection amendment is started.

[0026] Two measure the strength of the light by CPU#105, and the operation which extracts based on the result and determines exposure parameters, such as a value and shutter speed, is performed.
[0027] # In 106, focal detection equipment performs focal detection.
[0028] # Perform in 107 condition detection of the switch SW2 switch on by the 2nd stroke of a shutter release. This switch SW2 is a switch on which actual shutter release actuation is made to perform. If this switch SW2 is off, it remains in #107, and if turned on, it will progress to #108.
[0029] # In 108, start timer interruption processing in which the sampling of deflection detection of the pitch direction is set up the twice of the direction of a yaw, and continue henceforth to #113.
[0030] # Perform rise actuation of a mirror 6 in 109.
[0031] # In 110, make it run a shutter point curtain and start the exposure to a film.
[0032] # Make it run an after [a shutter] curtain based on the shutter speed computed by the aforementioned #105, terminate exposure, and make it return to a mirror Hara location in 111 #112.
[0033] # In 113, end the timer interruption processing started by #108, and return to the condition before setting up a sampling by #108.
[0034] # Perform shutter charge film feed in 114.
[0035] The amendment optical system 9 is fixed in the center by CPU#115 by 11 returning the pitch actuator for image blurring amendment, and the York actuator to a home position, and it is made to stop after that. And finally a gyroscope is suspended by #116.
[0036] Drawing 5 is the flow chart which showed the timer interruption processing which doubles the sampling of deflection detection of the pitch direction.
[0037] Conversion to digital data is first started for the output from the deflection detection sensor 5 of the shown direction of a yaw by A/D converter 3 #130.
[0038] # Detection of that this conversion was completed by 131 performs a predetermined operation to this conversion result by #132.
[0039] Then, in #133, the contents of this result of an operation are transmitted to a transmitting data register.
[0040] Then, an actual send action is started in #134.
[0041] Here, the data-conversion subroutine shown in drawing 6 to this data-conversion actuation is used. In actuation of this data-conversion subroutine, the contents of the ADDATA register with which the result of an AD translation is first memorized by #150 are transmitted to general-purpose arithmetic register A of the CPU2 interior, next similarly the data for amending each sensor sensibility in #151 are transmitted to general-purpose arithmetic register B, finally the multiplication of the two above-mentioned general-purpose arithmetic registers is performed by #152, and that result is set as Register C.
[0042] Here, with reference to the timing chart of drawing 7 , how to transmit the output of sensors 4 and 5 to a lens from the body of a camera is explained. The serial data with which SCK is transmitted to synchronous-clock non for serial communication, and SDO is transmitted to a lens side from the body of a camera in this drawing, and SDI are serial data transmitted to the body of a camera from a lens side at coincidence.
[0043] Synchronizing with a synchronous clock SCK, the lock discharge command SDO of which MEKAROKKU of the amendment optical system 9 is canceled first is transmitted. Subsequently, the sensor output command SDO which shows the output of sensors 4 and 5 is transmitted. Naturally in this command, the flag for distinction, such as a yaw and a pitch, is

contained. Next, the contents of the register C equivalent to the output of a sensor are transmitted as at least 1 bytes or more of serial data SDO. A lens side will transmit the BUSY signal which shows that data were received, if data are received.

[0044] In this way, if it is detected by #135 that the sensor data transfer was completed, the A/D-conversion actuation to the sensor output of the pitch direction will be started by #136. About #136-141 used as the processing to the sensor output of this pitch direction, since it is completely the same as #130-135 of the direction of a yaw, explanation is omitted.

[0045] Then, in #142, it distinguishes whether the predetermined number of deflection detection of the pitch direction was performed. With this operation gestalt, it may be 2 times. And if a predetermined count line is, the flag of this timer interruption will be cleared by 0 by #143, and interrupt-processing actuation will be ended. On the other hand, when a predetermined count is not become, it returns to #136 and deflection detection of the pitch direction is performed once again.

[0046] Thus, on processing of CPU2, an interrupt occurs to every fixed period T, and the sensor output of the direction of a yaw established in the body of a camera and the pitch direction is transmitted to a lens at a rate of 1:2.

[0047] Drawing 8 is drawing 4 and a timing chart showing processing of drawing 5 .

[0048] It is begun as usual by turns to detect the deflection of the pitch direction and the direction of a yaw, if SW1 is turned on by t103. If SW2 is turned on by t107, deflection detection of the pitch direction can be increased twice, and the deflection of the RF by the shutter shock and mirror shock which have appeared in the pitch direction can be detected.

[0049] Thus, in this operation gestalt, the deflection of the high frequency by the shutter shock or the mirror shock is detected, and that detection data is transmitted to a lens side, and whenever it receives this data, it is made to perform control of amendment optical system by the lens side by increasing the sampling of deflection detection of the pitch direction in the deflection sensor in a camera twice during release actuation.

[0050] (2nd operation gestalt) Drawing 9 is the block diagram of the camera lens system of the 2nd operation gestalt. In this operation gestalt, the output of the sensors 4 and 5 which detect the yaw of the whole camera and the deflection of the pitch direction is changed into digital data by A/D converter 3, and is incorporated as data in CPU2. The data in this CPU2 are transmitted to CPU11 in an interchangeable lens through the serial bus line 19 of dedication which is different in the serial bus line 7 which performs the usual exchange with the body 1 of a camera, and an interchangeable lens 8.

[0051] On the other hand, within an interchangeable lens 8, the output of location detection means 15 and 16 of amendment optical-system 9 the very thing to detect a location absolutely is changed into digital data by A/D converter 18, and it is incorporated in the above CPU 11, and further, by CPU11, the sensor data from the body of a camera mentioned above are compared with the location data of this amendment optical system 9, and that comparison result is transmitted to D/A converter 12.

[0052] Therefore, finally the output from D/A converter 12 is inputted into driver lines 13 and 14, and the amendment optical system 9 drives according to the supply voltage from this driver line.

[0053] In addition, about the processing by the side of a camera, and the processing by the side of a lens, it is the same as that of the 1st operation gestalt.

[0054] Thus, with this operation gestalt, the output data of the deflection sensor of a camera side body are transmitted to a lens side through a different serial bus line from the usual camera and the communication link between lenses.
[0055] (3rd operation gestalt) Drawing 10 A and drawing 10 B are the flow charts for explaining actuation of the camera lens system of the 3rd operation gestalt. This operation gestalt changes the ratio of a sampling of deflection detection of the pitch direction and the direction of a yaw according to the shutter speed at the time of photography, and the fundamental configuration of the camera in this operation gestalt is completely the same as drawing 9 as drawing 1 as 1st operation gestalt, or 2nd operation gestalt.
[0056] First, as shown in drawing 10 A, CPU2 performs from #201 condition detection of the switch SW1 switch on by the 1st stroke of a release carbon button in #202. If this switch SW1 is off, it remains in #202, if it is ON, it progresses to #203, and a gyroscope is started.
[0057] Then, the pitch actuator for image blurring amendment and a yaw actuator are driven in #204, and hand deflection amendment is started.
[0058] Then, CPU2 measures the strength of the light in #205, and the operation which extracts based on the result and determines exposure parameters, such as a value and shutter speed, is performed.
[0059] Then, in #206, this focal detection equipment performs focal detection.
[0060] Then, in #207, it turns on by the 2nd stroke of a shutter release, and condition detection of the switch SW2 accompanying actual shutter release actuation is performed. If this switch SW2 is off, it remains in #207, and if turned on, it will progress to #208.
[0061] Then, in #208, the shutter speed calculated by #205 is seen, if shutter speed is slower than 1/10, it will progress to #109 and the sampling of deflection detection of the pitch direction will be doubled to the direction of a yaw. If it is 1/10 or more, it will progress to #210.
[0062] Then, in #210, the shutter speed calculated by #205 like #208 is seen, if shutter speed is 1/500 or less, it will progress to #211 and the sampling of deflection detection of the pitch direction will be increased 3 times to the direction of a yaw. If quicker than 1/500, it will progress to #212 and the sampling of deflection detection of the pitch direction will be increased 4 times to the direction of a yaw. # Perform rise actuation of a mirror 6 in 213.
[0063] Then, as shown in drawing 9 B, in #214, it is made to run a shutter point curtain and the exposure to a film is started. # Make it run an after [a shutter] curtain based on the shutter speed computed by the aforementioned #205, terminate exposure, and make it return to a mirror Hara location in 215 #216. # Return in 217 the sampling of deflection detection of #209, #211, and the pitch direction set up in #212 to the usual condition.
[0064] Then, shutter charge film feed is performed in #218. The amendment optical system 9 is fixed in the center by CPU#219 by 11 returning the pitch actuator for image blurring amendment, and the York actuator to a home position, and it is made to stop after that. Finally a gyroscope is suspended by #220.
[0065] Thus, with this operation gestalt, in order for **** by transit of a back curtain to occur and to suppress the effect before the deflection by transit of the point curtain of a shutter is settled when shutter speed is slow, according to the shutter speed at the time of photography, the ratio of a sampling of deflection detection of the pitch direction and the direction of a yaw is changed.
[0066]

[Effect of the Invention] As explained above, accurate image blurring amendment can be performed by detecting and amending the deflection of the RF by the shutter shock or the mirror shock according to this invention.

DESCRIPTION OF DRAWINGS [Brief Description of the Drawings]
[Drawing 1] It is the camera lens system configuration Fig. of the 1st operation gestalt of this invention.
[Drawing 2] It is drawing showing the configuration of the angular-acceleration sensor in the camera lens system of the 1st operation gestalt of this invention.
[Drawing 3] It is the exploded view of the shift optical system which amends include-angle blurring of a camera.
[Drawing 4] It is the flow chart which shows actuation of the camera lens system of the 1st operation gestalt of this invention.
[Drawing 5] It is the flow chart of the timer interruption processing which doubles the sampling of the pitch direction.
[Drawing 6] It is the flow chart of data-conversion processing.
[Drawing 7] It is a timing chart for explaining incorporation of a sensor output.
[Drawing 8] It is the timing chart which shows actuation of the camera lens system of the 1st operation gestalt of this invention.
[Drawing 9] It is the camera lens structure-of-a-system Fig. of the 2nd operation gestalt of this invention.
[Drawing 10 A] It is the flow chart which shows actuation of the camera lens system of the 3rd operation gestalt of this invention.
[Drawing 10 B] It is a continuation of the flow chart of drawing 10 A.
[Drawing 11] It is the wave form chart showing the gyroscope output under release actuation.
[Drawing 12] It is the wave form chart showing the gyroscope output under release actuation.
[Description of Notations]
1 Body of Camera
2 CPU of Camera
4 Five Deflection detection sensor
6 Mirror
7 Serial Bus Line
8 Interchangeable Lens
9 Amendment Optical System
11 CPU of Interchangeable Lens

[Translation done.]